REMARKS

The Office Action mailed March 29, 2008 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-20, 25, 26, and 28-31 are now pending in this application. Claims 21-24 and 27 have been cancelled. Claims 1-21, 23, and 25-31 stand rejected. Claims 22 and 24 stand objected to.

Applicants acknowledge and thank the Examiner for the indication that Claims 22 and 24 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The rejection of Claims 1-7, 9, 10, 12, 16-19, 21, 23, and 26-31 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 4,727,325 to Matsui et al. (hereinafter referred to as "Matsui") in view of U.S. Pat. No. 5,892,358 to King (hereinafter referred to as "King"), further in view of U.S. Pat. No. 6,068,595 to Miyazaki et al. (hereinafter referred to as "Miyazaki") is respectfully traversed.

Claim 22 was objected to as being dependent upon a rejected base claim, but was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 1 has been amended to include the limitations of Claim 22 and intervening Claim 21 and Claims 21 and 22 have been canceled. Claim 1 is submitted to be in a condition for allowance.

Claims 21 and 23 have been cancelled. Claims 2-7, 9, 10, 12, 16-19, 30, and 31 depend from independent Claim 1. When the recitations of Claims 2-7, 9, 10, 12, 16-19, 30, and 31 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-7, 9, 10, 12, 16-19, 30, and 31 likewise are patentable over the cited art.

Claim 26 has been amended to incorporate the limitation indicated as being allowable in Claims 21 and 22 and now recites a method for a medical examination comprising "sampling datasets on to an elliptical grid in polar coordinates in a k-space to generate signals representative of an object of interest that is being medically examined, wherein the dataset are frequency encoded in a Z-direction of the k-space, the Z-direction substantially parallel to a center axis of the elliptical grid, said sampling comprises phase encoding in which each

datum is represented as m(acos(2πd/n)k_x + bsin(2πd/n)k_y + ick_z, a, b, c, and d are real numbers, m, n, and i are an integers, and k_x, k_y, and k_z being unit basis vectors in the k-space . . . and forming a nested loop, the nested loop comprising . . . frequency encoding n_1 times along a k_z axis by keeping m, a, d, b, n, and c constant, and varying i . . . phase encoding radially once by keeping a, d, b, n, and c constant and varying m for every n_1 number of times of frequency encoding . . . phase encoding radially for n_2 number of times . . . phase encoding rotationally once by keeping a, b, n, and c constant and varying d for every n_2 number of times of radial phase encoding . . . and phase encoding rotationally for n_3 number of times." Claim 26 is therefore submitted to be in a condition for allowance.

Claim 27 has been cancelled.

Claim 28 has been amended to incorporate the limitation indicated as being allowable in Claims 21 and 22 and now recites a magnetic resonance imaging (MRI) system comprising "a main magnet to generate a uniform magnetic field . . . a radio frequency pulse generator for exciting the magnetic field . . . a gradient field generator for generating gradients extending in different directions in the magnetic field . . . a receiver for receiving magnetic field magnetic resonance (MR) signals representative of an object . . . and a controller for polar phase encoding to generate the MR signals forming datasets representative of the object by frequency encoding in a Z-direction of a k-space, wherein the datasets form an elliptical grid in polar coordinates in the k-space, the Z-direction substantially parallel to a center axis of the elliptical grid, said controller configured to . . . phase encoding by representing each datum as m(acos(2πd/n)k_x + bsin(2πd/n)k_y + ick_z, a, b, c, and d are real numbers, m, n, and i are an integers, and k_x, k_y, and k_z being unit basis vectors in the k-space . . . and form a nested loop, the nested loop comprising . . . frequency encoding n_1 times along a k_z axis by keeping m, a, d, b, n, and c constant, and varying i . . . phase encoding radially once by keeping a, d, b, n, and c constant and varying m for every n_1 number of times of frequency encoding . . .phase encoding radially for n_2 number of times . . . phase encoding rotationally once by keeping a, b, n, and c constant and varying d for every n_2 number of times of radial phase encoding . . . and phase encoding rotationally for n_3 number of times." Claim 28 is therefore submitted to be in a condition for allowance.

Claim 24 was objected to as being dependent upon a rejected base claim, but was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 29 has been amended to incorporate the

limitations indicated as being allowable in Claim 24 and intervening Claim 23 and Claims 23 and 24 have been canceled.

Claim 29 now recites a controller programmed to "polar phase encode to generate a plurality of magnetic resonance (MR) signals forming datasets representative of an object by frequency encoding in a Z-direction of a k-space, wherein the datasets form an elliptical grid in polar coordinates in the k-space, the Z-direction substantially parallel to a center axis of the elliptical grid, wherein said polar phase encoding comprises phase encoding in which each datum is represented as $m(a\cos(2\pi d/n)k_x + b\sin(2\pi d/n)k_y) + jr(a\cos(2\pi d/n)k_x + b\sin(2\pi d/n)k_y) + ick_z$, a, b, c, d, and r are real numbers, m, j, n, and i are an integers, and k_x, k_y, and k_z being unit vectors in the k-space . . . and form a nested loop, the nested loop comprising . . . frequency encoding the datasets m_1 times along a k_z axis by keeping m, a, d, n, b, j, r, and c constant, and varying i . . . phase encoding radially once by keeping a, d, n, b, j, r, and c constant and varying m for every n_1 number of times of frequency encoding . . . phase encoding radially for m_2 number of times . . . phase encoding translationally once by keeping a, d, n, b, r, and c constant and varying j for every m_2 number of times of radial phase encoding . . . phase encoding translationally for m_3 number of times . . . phase encoding rotationally once by keeping a, n, b, r, and c constant and varying d for every m_3 number of times of translational phase encoding . . . and phase encoding rotationally for m_4 number of times." Claim 29 is therefore submitted to be in a condition for allowance.

Accordingly, for at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-7, 9, 10, 12, 16-19, 21, 23, and 26-31 be withdrawn.

The rejection of Claims 1-7, 26, and 27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,486,670 to Heid (hereinafter referred to as "Heid") in view of King, further in view of Miyazaki is respectfully traversed.

Claim 22 was objected to as being dependent upon a rejected base claim, but was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 1 has been amended to include the limitations of Claim 22 and intervening Claim 21 and Claims 21 and 22 have been canceled. Claim 1 is submitted to be in a condition for allowance.

Claims 2-7 depend from independent Claim 1. When the recitations of Claims 2-7 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-7 likewise are patentable over the cited art.

Claim 26 has been amended to incorporate the limitation indicated as being allowable in Claims 21 and 22 and now recites a method for a medical examination comprising "sampling datasets on to an elliptical grid in polar coordinates in a k-space to generate signals representative of an object of interest that is being medically examined, wherein the dataset are frequency encoded in a Z-direction of the k-space, the Z-direction substantially parallel to a center axis of the elliptical grid, said sampling comprises phase encoding in which each datum is represented as $m(a\cos(2\pi d/n)k_x + b\sin(2\pi d/n)k_y + ick_z$, a, b, c, and d are real numbers, m, n, and i are an integers, and k_x, k_y, and k_z being unit basis vectors in the k-space . . . and forming a nested loop, the nested loop comprising . . . frequency encoding n_1 times along a k_z axis by keeping m, a, d, b, n, and c constant, and varying i . . . phase encoding radially once by keeping a, d, b, n, and c constant and varying m for every n_1 number of times of frequency encoding . . . phase encoding radially for n_2 number of times . . . phase encoding rotationally once by keeping a, b, n, and c constant and varying d for every n_2 number of times of radial phase encoding . . . and phase encoding rotationally for n_3 number of times." Claim 26 is therefore submitted to be in a condition for allowance.

Claim 27 has been cancelled.

Accordingly, for at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-7, 26, and 27 be withdrawn.

The rejection of Claims 1-7, 10, 14, 19, 20, and 25 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,794,869 to Brittain (hereinafter referred to as "Brittain") in view of King, further in view of Miyazaki is respectfully traversed.

Claim 22 was objected to as being dependent upon a rejected base claim, but was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 1 has been amended to include the limitations of Claim 22 and intervening Claim 21 and Claims 21 and 22 have been canceled. Claim 1 is submitted to be in a condition for allowance.

Claims 2-7, 10, 14, 19, and 20 depend from independent Claim 1. When the recitations of Claims 2-7, 10, 14, 19, and 20 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-7, 10, 14, 19, and 20 likewise are patentable over the cited art.

Claim 24 was objected to as being dependent upon a rejected base claim, but was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 25 has been amended to incorporate the limitations indicated as being allowable in Claim 24 and intervening Claim 23 and Claims 23 and 24 have been canceled.

Claim 25 now recites a magnetic resonance (MR) method for medical examinations comprising "injecting a patient with a contrast agent that flows into a vasculature of the patient . . . acquiring MR signals produced by spins in the vasculature from an MR imaging system . . . polar phase encoding to generate the MR signals forming datasets representative of the patient by frequency encoding in a Z-direction of a k-space, wherein the datasets form an elliptical grid in polar coordinates in the k-space, the Z-direction substantially parallel to a center axis of the elliptical grid, wherein said polar phase encoding comprises phase encoding in which each datum is represented as $m(a\cos(2\pi d/n)k_x + b\sin(2\pi d/n)k_y) + jr(a\cos(2\pi d/n)k_x + b\sin(2\pi d/n)k_y) + ic\vec{k}_z$, a, b, c, d, and r are real numbers, m, j, n, and i are an integers, and k_x, k_y, and $\vec{k}_z$ being unit vectors in the k-space . . . and forming a nested loop, the nested loop comprising . . . frequency encoding the datasets m_1 times along a k_z axis by keeping m, a, d, n, b, j, r, and c constant, and varying i . . . phase encoding radially once by keeping a, d, n, b, j, r, and c constant and varying m for every n_1 number of times of frequency encoding . . . phase encoding radially for m_2 number of times . . . phase encoding translationally once by keeping a, d, n, b, r, and c constant and varying j for every m_2 number of times of radial phase encoding . . . phase encoding translationally for m_3 number of times . . . phase encoding rotationally once by keeping a, n, b, r, and c constant and varying d for every m_3 number of times of translational phase encoding . . . and phase encoding rotationally for m_4 number of times." Claim 25 is therefore submitted to be in a condition for allowance.

Accordingly, for at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-7, 10, 14, 19, 20, and 25 be withdrawn.

The rejection of Claims 1-8, 11, 13, and 15 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pub. No. 2002/0175683 to Mertelmeier et al. (hereinafter referred to as "Mertelmeier") in view of King, further in view of Miyazaki is respectfully traversed.

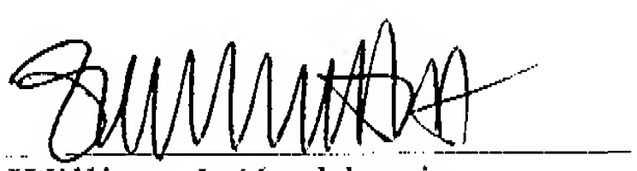
Claim 22 was objected to as being dependent upon a rejected base claim, but was indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 1 has been amended to include the limitations of Claim 22 and intervening Claim 21 and Claims 21 and 22 have been canceled. Claim 1 is submitted to be in a condition for allowance.

Claims 2-8, 11, 13, and 15 depend from independent Claim 1. When the recitations of Claims 2-8, 11, 13, and 15 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-8, 11, 13, and 15 likewise are patentable over Mertelmeier in view of Anand.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-8, 11, 13, and 15 be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,



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